

CLAIMS

What is claimed is:

1. A method for assigning a set of predetermined lightpath connections between nodes to wavelengths in a wavelength-division multiplexed optical ring communications network, comprising the steps of:

(a) determining whether a subset of the lightpath connections exists so that each of the nodes includes exactly one of an origination for one of the lightpath connections, a termination for one of the lightpath connections, and a traversal of one of the lightpath connections;

(b) assigning said subset determined at said step (a) to one of the wavelengths;

(c) removing said subset determined at said step (a) from said set of lightpath connections; and

(d) repeating said steps (a)-(c) until no more of said subsets are determined to exist.

2. The method according to claim 1, further comprising the steps of:

(e) determining whether any of the wavelengths do not have any of said lightpath connections assigned thereto;

(f) determining whether any of said lightpath connections remain in said set;

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- (g) selecting one of said lightpath connections determined to be remaining in said set at said step (f);
 - (h) moving said one lightpath connection selected at said step (g) to one of the wavelengths determined not to have any assigned lightpath connections at said step (e); and
 - (i) repeating said steps (e)-(h) until no more of the wavelengths are determined not to have any assigned lightpath connections at said step (e).

3. A method for assigning a set of predetermined lightpath connections to wavelengths in a wavelength-division multiplexed optical ring communications network, comprising the steps of:

- (a) selecting one of the predetermined lightpath connections from the set to form a linked component group bounded by an originating node and a terminating node;
- (b) removing said lightpath connection selected at said step (a) from the set;
- (c) examining whether at least one of said lightpath connections remaining in said set either terminates at said originating node or originates at said terminating node;

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- (d) when at least one lightpath connection exists at said step (c), determining whether said at least one light path connection traverses any portion of said linked component group;
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- (e) when at least one lightpath connection is determined not to traverse any portion of said linked component group at said step (d), selecting one said lightpath connection to expand said linked component group to have either a different terminating node or a different originating node;
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- (f) removing said one lightpath connection selected from said set at said step (e);
- (g) repeating said steps (c)-(f) until no more of said lightpath connections are selected at said step (e);
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- (h) assigning a wavelength to said linked component group when no more of said lightpath connections are selected at said step (e); and
- (i) repeating said steps (a)-(h) until no more lightpath connections remain in the set.
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4. The method according to claim 3, further comprising the steps of:

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- (j) determining whether any of the wavelengths do not have any lightpath connections assigned thereto;
- (k) finding one of said lightpath connections isolated from said linked component group;
- (l) moving said one lightpath connection found to be isolated at step (k) to one of the wavelengths determined not to have any assigned lightpath connections at said step (j); and
- 10 (m) repeating said steps (j)-(l) until no more lightpath connections are found to be isolated at said step (k).
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5. The method according to claim 3, wherein said step (e) further comprises selecting the longest one of said lightpath connections which may be connected to said linked component group.
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6. The method according to claim 3, wherein said step (e) further comprises selecting one of said lightpath connections which result in a minimum number of connected lightpath components after
- 25 removal of said one lightpath connection.
7. The method according to claim 3, wherein step (e) further comprises selecting ones of said lightpath

connections that minimize fragmented lightpaths from said linked component group.

5 8. A method for analyzing predetermined lightpath arcs in a wavelength-division multiplexed optical ring communications network to form complete lightpath circles around the ring, comprising the steps of:

- 10 (a) forming a partial circle from the predetermined lightpath arcs;
- (b) iteratively identifying complete lightpath circle subsets of lightpath arcs which have been determined to form a complete lightpath circle from said partial circle;
- 15 (c) removing the lightpath arcs of each said complete lightpath circle subset from the remaining ones of the predetermined lightpath arcs; and
- 20 (d) repeating said steps (a)-(c) whenever one said complete circle subset is created until no more of said complete lightpath circle subsets are identified at said step (b).

25 9. The method according to claim 8, wherein said lightpath arcs comprise lightpath segments around the ring.

10. The method according to claim 8, wherein said partial circle comprises a set of said lightpath arcs which do not overlap any other segments of lightpaths in said set and form a continuous portion around the ring.

11. The method according to claim 8, wherein said complete lightpath circle comprises a set of said lightpath arcs which are joined together without overlapping to form one continuous lightpath around the ring.